



Efficiency & Environmental (E2) Solutions for Small Forward Operating Bases

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EFFICIENCY AND ENVIRONMENTAL (E2) SOLUTIONS FOR SMALL FORWARD OPERATING BASES

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US Army Force Provider System



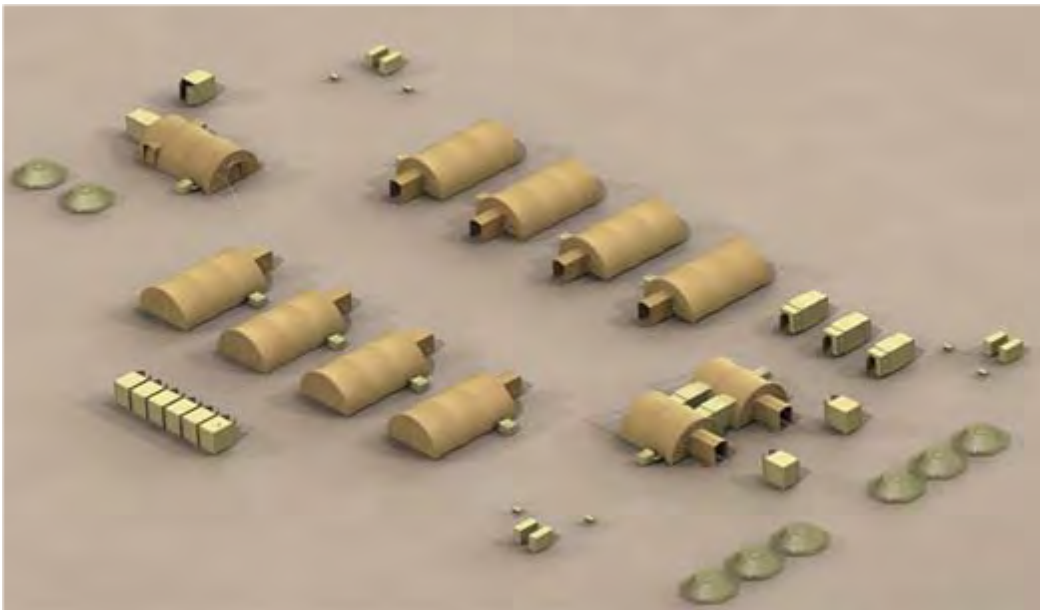
- **Containerized for transport & pre-positioning**
 - Air, Land & Sea
- **Rapid Set Up & Strike**
- **Re-deployable > 10 times**
- **Modular Design**
 - Company & Platoon Size Packages
- **Interoperable with USAF BEAR**
- **Entire inventory employed in Afghanistan**
 - 56 BN Modules + Customer Orders



C-17 Loaded with full up Force Provider Company Package



Company Package Baseline

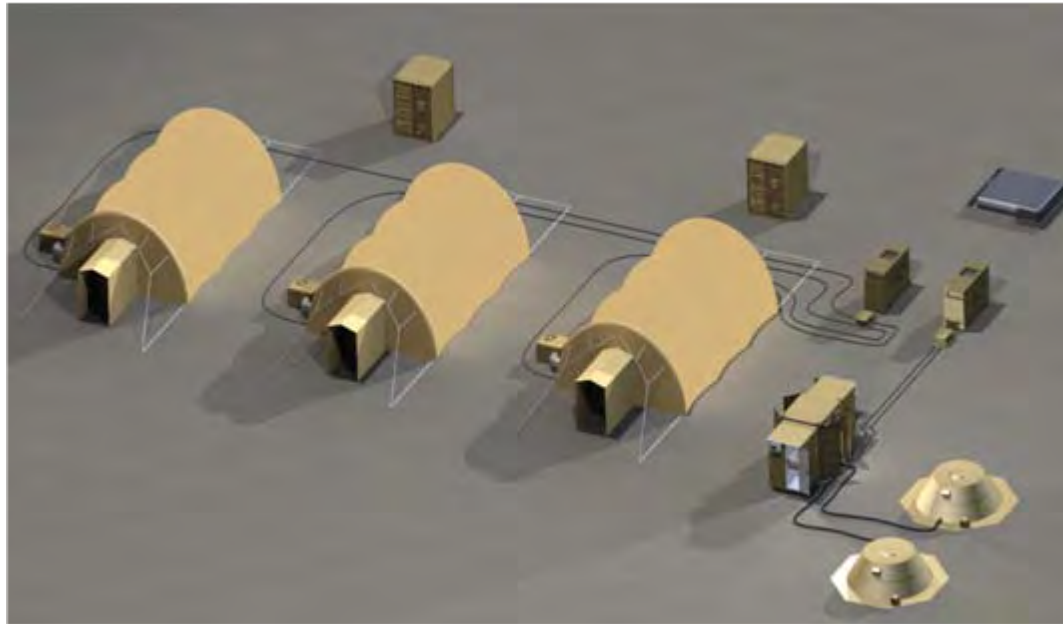


- **TEMPER Airbeam Tents (11)**
 - 64k BTU Environmental Control Units (11)
 - 120k BTU Space Heaters (11)
- **Tri-Con Showers (2)**
- **Tri-Con Kitchen (1)**
- **Tri-Con Latrines (2)**
- **Tri-Con Laundry (1)**
- **60 kW Tactical Quiet Generators (5)**

*Theoretical
Worst Case*

150 PAX		Force Provider Company Package	
		<i>Supply Water Hauled In (No well)</i>	
		Summer	Winter
Fuel Consumed (gallons)	Daily	582	806
	Annually	200 to 225,000	
Supply Water Trucked In (gals)	Daily	5,545	
	Annually	2,023,925	
Gray Water Generated (gals)	Daily	4,325	
	Annually	1,578,625	
Black Water Generated (gals)	Daily	1,274	
	Annually	465,010	
Solid Waste Generated (lbs)	Daily	1,200	
	Annually	438,000	
Est. Truck Hauls (FUEL)	Annually	42	
Est. Truck Hauls (WATER)	Annually	814	

Platoon Package Baseline



- **TEMPER Airbeam Tents (3)**
 - 64k BTU Environmental Control Units (3)
 - 120k BTU Space Heaters (3)
- **Integrated Hygiene Complex (1)**
- **Assault Kitchen Kit (1)**
- **60 kW Tactical Quiet Generators (2)**

*Theoretical
Worst Case*

50 PAX		Platoon Expeditionary Camp (PEC)	
		Supply Water Hauled In (No well)	
		Summer	Winter
Fuel Consumed (gallons)	Daily	188	177
	Annually	55 to 65,000	
Supply Water Trucked In (gals)	Daily	1,620	
	Annually	591,300	
Gray Water Generated (gals)	Daily	1,200	
	Annually	438,000	
Black Water Generated (gals)	Daily	500	
	Annually	182,500	
Solid Waste Generated (lbs)	Daily	400	
	Annually	146,000	
Estimated Fuel Truck Hauls	Annually	12	
Estimated Water Truck Hauls	Annually	242	

Efficiency & Environmental (E2) Rapid Fielding Project

- ARCENT Sponsored
- Select Best Value “Off the Shelf” Solutions for Company & Below Bases in Afghanistan
 - ❖ *Force Provider equipped*
- Deploy Solutions to AOR in 2011
 - ❖ *Micro-Fielding*



Objectives

*Improve
Sustainment
Efficiency*

*Reduce
Environmental
Risks*



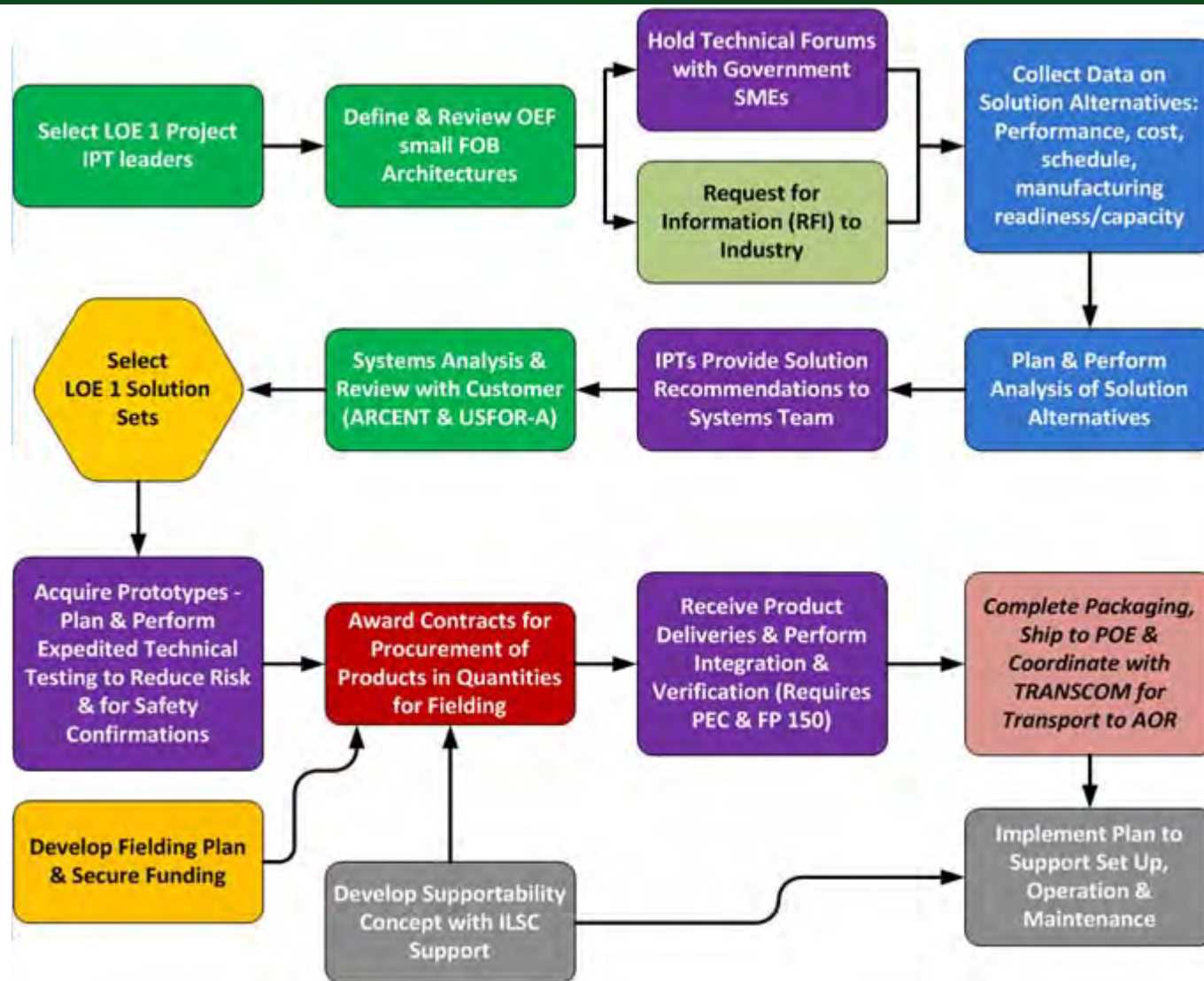
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E2 Project Process Flow



Water Management (WM)

Reduce **water resupply demand**

Reduce **environmental & health** impact of liquid waste generated

Minimize increases in **energy demand**

❖ *Water Purification, Recycle and Treatment*



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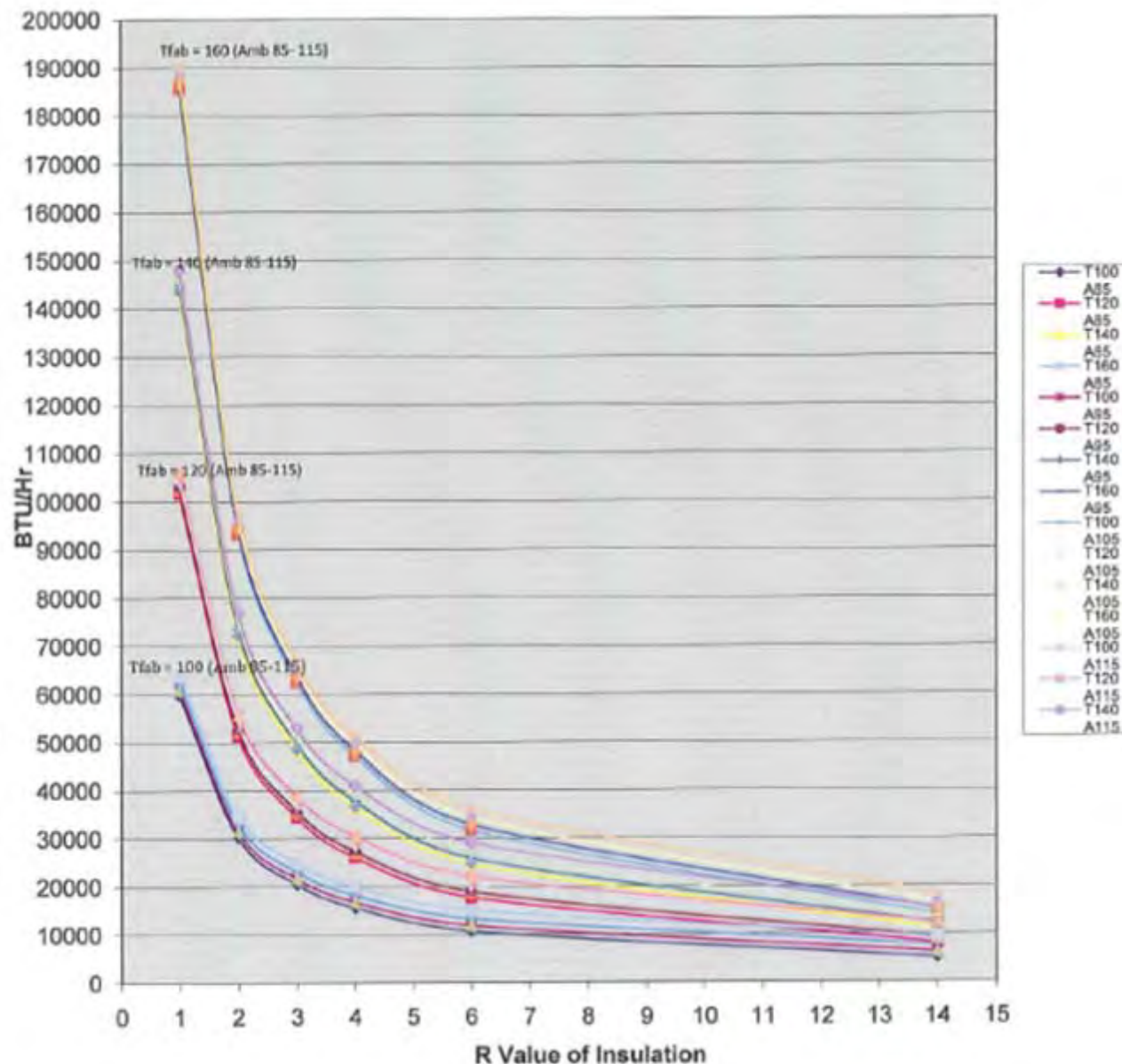
Energy Efficient Structures (E2S)

Reduce the **energy/fuel** required for heating/cooling of shelters & structures

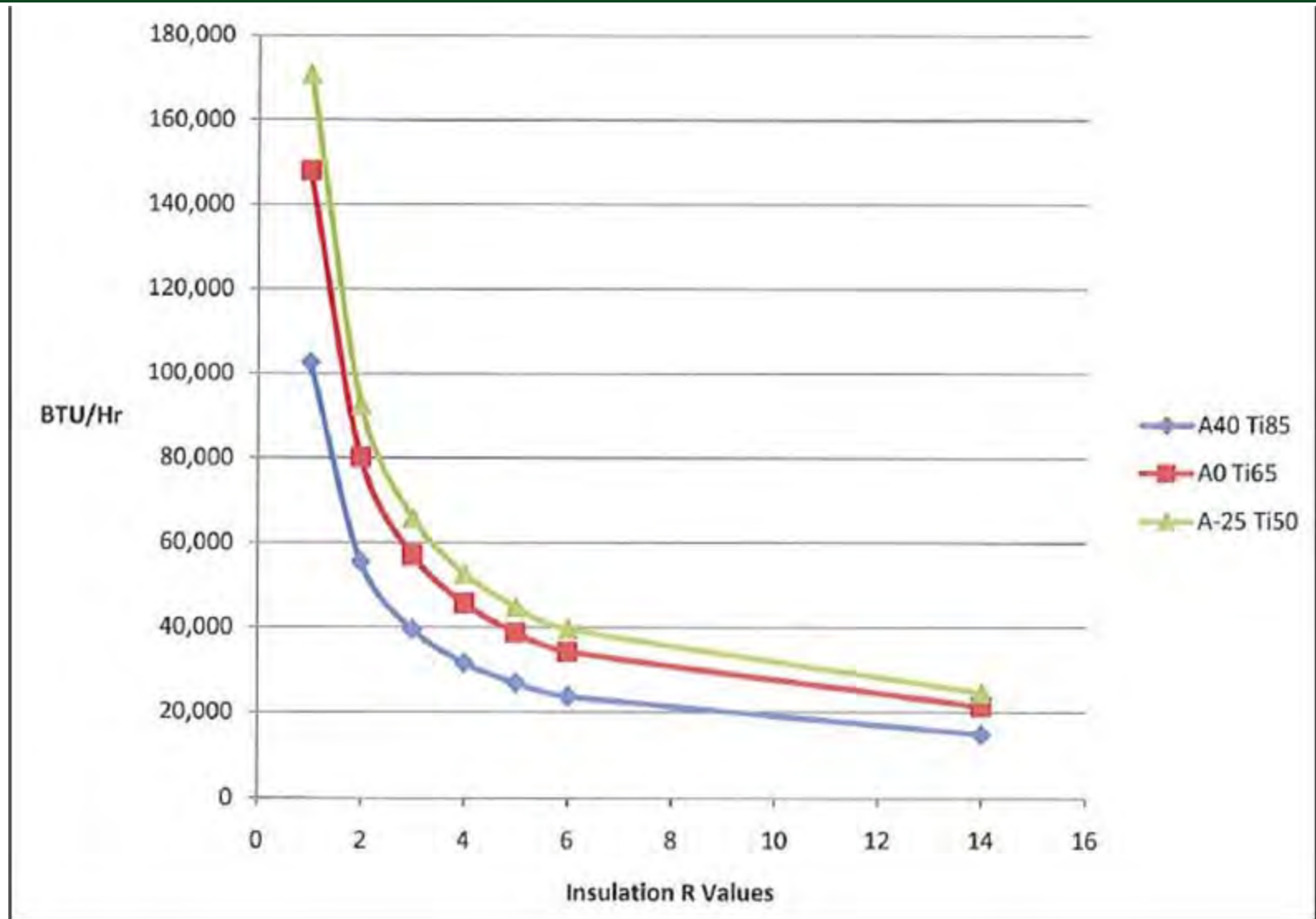
- ❖ *Improve insulation & reduce solar loads*
- ❖ *Maintain shelter redeployment capability*
- ❖ *Right Size HVAC systems*



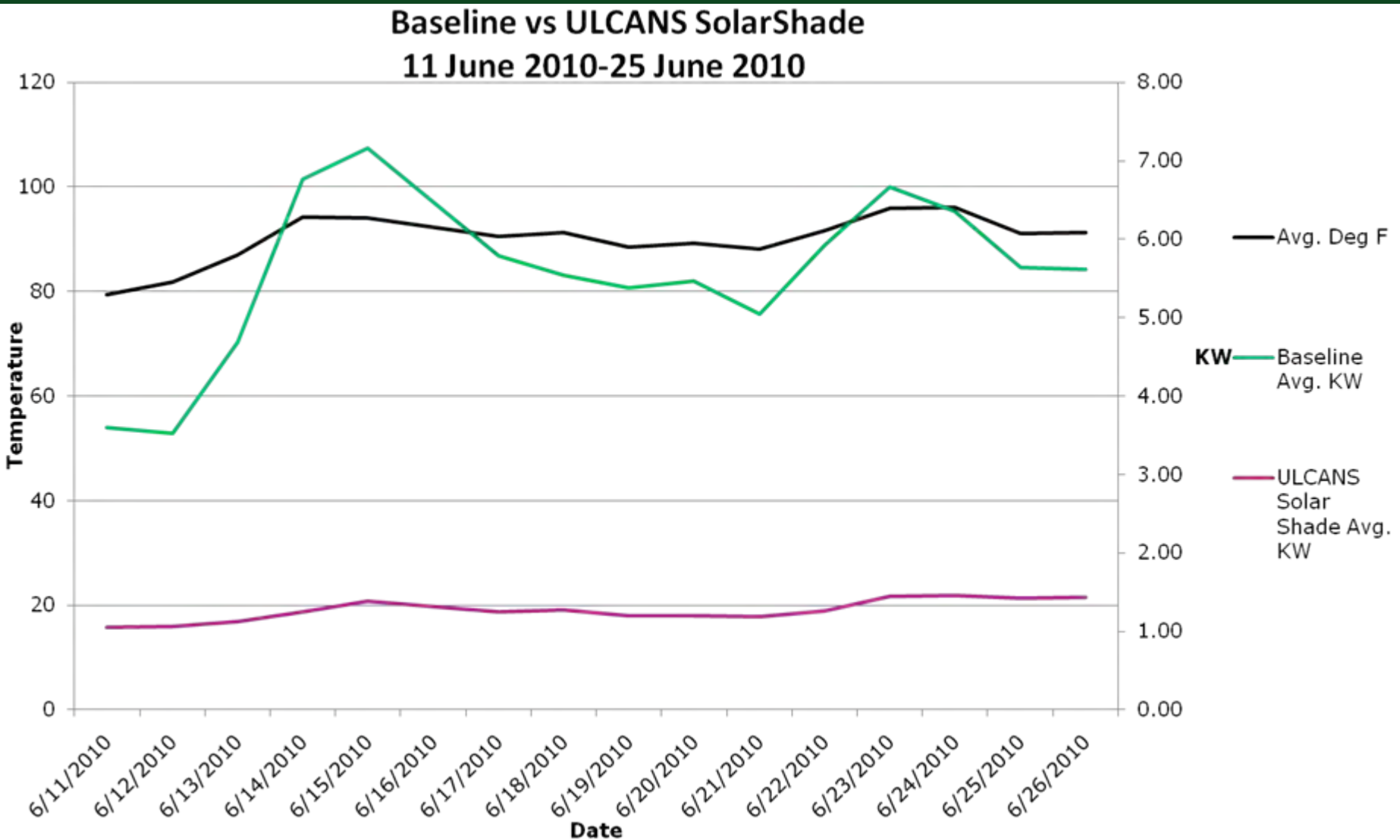
Tent Cooling: R-Value vs. BTU/hr vs. Fabric Temp



Tent Heating: R-Value vs. BTU/hr vs. Ambient/Interior Temps



ULCANS Solar Shade vs. Baseline



Energy Efficient Structures (E2S)

Rigid Structures as Tent Replacements



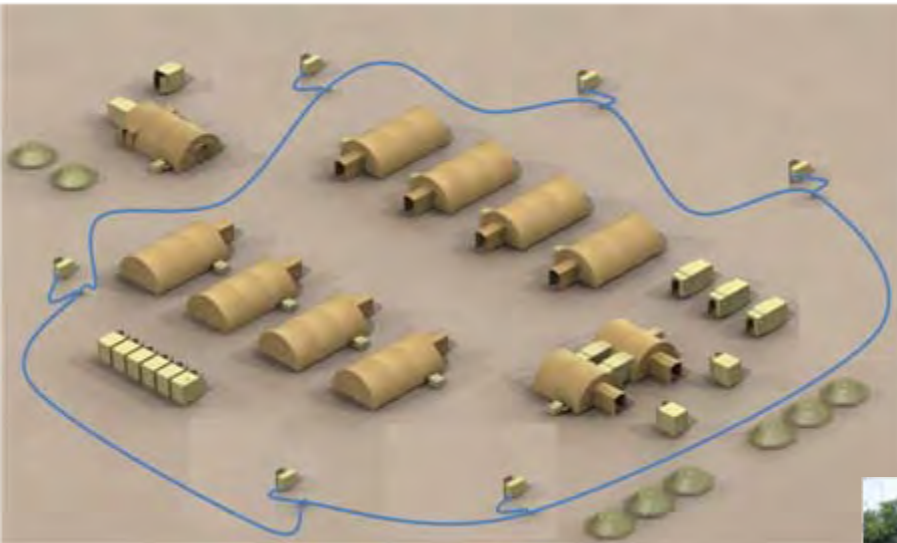
Power Generation (PG)

Reduce the **fuel** required to generate power

Solar Water Heating



60 kW TQG Micro Grid



*Renewable
Energy*



Solid Waste Management (SWM)

Reduce the **volume** of non-hazardous solid waste generated

Reduce the health risks associated with **open burning** of solid waste



Incinerators sized for Platoon & Company Camps



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PM FSS Systems Integration Lab

Fort Devens, MA

- SIL operational in Jan 2011
- Simulated operational environment → *Troops in the loop*
- Force Provider Platoon & Company Packages
 - Control Baseline
 - Configuration with E2 Add On Kits
- Instrumented for **data collection**
 - Water Flows, Continuous Power, Fuel Consumption, Solid Waste
- Product Testing, Integration & Validation
- Safety Release





1. EXISTING CONDITIONS PLAN
2. SITE PLAN
3. UTILITY PLAN
4. SUBSTATION DETAILS

- 1) THE INFORMATION SHOWN ON THIS PLAN IS THE RESULT OF AN ON-DECK SURVEY CONDUCTED BY ARI DESIGN CONSULTING INC. PERFORMED IN OCTOBER 2016.
- 2) ELEVATIONS SHOWN ARE BASED ON AN ASSUMED DATUM.
- 3) THE LOCATIONS OF THE EXISTING LEACH PILES ARE BASED ON K-18-R-17 PLANS PROVIDED TO ARI DESIGN BY STRUTS.
- 4) UNDERGROUND UTILITIES (ELECTRIC, WATER) SHOWN IN THE AREA OF THE WEDDER ARE BASED ON RECORDS AND INFORMATION HAS BEEN PROVIDED TO ARI DESIGN REGARDING EXISTING UTILITIES.

LEGEND			
	WATERING HOLE		STAY HOLE
	TRUSS		STAY ANCHOR
	STAY ANCHOR		STAY HOLE
	CONCRETE SLAB		

Path Forward

Force Provider E2 Improvements

- **Testing 2-3Q FY11**
 - ❖ *Technical Testing & Safety Releases*
 - ❖ *Devens Integration & Operational Testing*
- **System of Systems Analysis**
 - ❖ *Quantify Impacts on Water, Fuel and Waste Logistics*
 - ❖ *Performance Trade Offs → Cost, Transport Footprint, Supportability*
- **Select Final Micro-Fielding Packages**
 - ❖ *Two each Platoon and Company Base Camps*
 - ❖ *Include integrated/ruggedized data collection in theatre*
- **Procure, Package & Deploy to Afghanistan**